

Title: Global Temperature Variations

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Significant Accomplishments for the Past Year:

Intercalibration statistics of all MSUs operating through 1990 were computed and brightness temperature anomalies on various space and time scales were compiled for MSU channels 2 (troposphere) and 4 (lower stratosphere). A tropospheric retrieval was developed through combination of channel 2 data from various view angles across the MSU scan swath to achieve cancellation of the influence of the lower stratosphere, and much of the upper troposphere, on that channel. Approximately twenty data sets were sent to various climate researchers for their research. Radiosonde validation of the MSU channel 2 and tropospheric retrieval anomalies was performed with ten years of data at all U.S.-controlled stations. It was found that the monthly  $2.5^{\circ}$  gridpoint anomalies in TB computed from the intercalibrated satellites were very highly correlated with radiosonde-calculated TB anomalies, with correlations generally ranging from 0.94 to 0.98 and standard error of estimate of  $0.15^{\circ}\text{C}$  in the tropics to  $0.30^{\circ}\text{C}$  at high latitudes. It was found that use of a static weighting function and neglect of water vapor variations in the radiosonde calculations of TB degraded the standard errors by an average of only  $0.02^{\circ}\text{C}$ . This means that a static weighting of various layer temperatures is sufficiently accurate for climate modellers to easily compute MSU channel 2 TB from their model output for comparison to the satellite data.

Focus of Current Research and Plans for Next Year:

Monthly updates of MSU data from NOAA will be processed at the end of each month and the derived datasets will be updated, along with satellite intercomparison statistics relating to noise and drift. An optical disk of all MSU temperature anomaly products will be produced and sent to the climate community.

Publications:

- Spencer, R.W. and J.R. Christy, 1990: Precise monitoring of global temperature trends from satellites. *Science*, **247**, 1558-1562.
- Spencer, R.W., J.R. Christy, and N.C. Grody, 1990: Global atmospheric temperature monitoring with satellite microwave measurements: Method and results, 1979-84. *J. Climate.*, **3**, 1111-1128.

- Spencer, R.W., and J.R. Christy, 1991a: Precision and radiosonde validation of satellite gridpoint temperature anomalies, Part I: MSU channel 2. Submitted to *J. Climate*.
- Spencer, R.W., and J.R. Christy, 1991b: Precision and radiosonde validation of satellite gridpoint temperature anomalies, Part I: A tropospheric retrieval and trends during 1979-90. Submitted to *J. Climate*.